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Mushroom identification apps for your smartphone - a critical appraisal

The Cowtown Curmudgeon
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Despite being intimate with fungi for nigh on 50 years, I am a notoriously poor taxonomist. Like many I was initially seduced by food, but then matured into toxicology, ecology and basic biology. My initial classification for fungi was based on the simple Russian system: "edible, poisonous, we don't care." Later in life, when art became a passion, I added a fourth category: "worth painting." Living in the Pacific Northwest I became familiar with about 120 of the common mushrooms and adept identifying the toxic few. As a pathologist, pattern recognition was the stock-in-trade, but I limited myself to

human disease, rather than consuming limited neuronal storage space with fungi. I am embarrassed about not being au courant with the thousands of different fungal species or their most current monikers, so I rely on others for assistance. Then, I thought, why not try one of the new smartphone apps?

Being an early adopter of computers I attempted writing a mushroom identification program while cutting my eyeteeth on Apple Basic in the 1970s. I discovered that dichotomous keys do not work as well for mushrooms as they do for plants, so gave up in disgust. Finally, synoptic keys became available, which are considerably better. One merely had to enter as many details of a mushroom as possible and the key would propose possible matches which

one could research further. One of the best of these (MycMatch) was written for the Pacific Northwest by Alan Gibson. An offshoot of this are the keys and pictorial keys managed by Danny Miller. As good as these are, few of us carry computers into the woods, so they are limited to when we return home, tired and wet, with baskets of edibles begging to be processed. Moreover, the initial versions were unable to keep up with technology changes, limiting widespread adoption.

Along came smartphones, soon accompanied by a panoply of identification apps — plants, birds, insects, rocks, bugs, wine and mushrooms. The granddaddy of all, adopted by every prospective biologist, is iNaturalist. My phone is dotted with

a selection of these apps, some of which work quite well, especially if your level of ignorance of a topic is high.

Disclosing my biases and prejudices will assist in better appreciating this evaluation. I prefer free apps. I might buy one if there is a one-time charge. I will never buy anything that requires a monthly or yearly subscription. Been there, done that. The hours and clicks required to cancel are not worth it. My children may still be responsible for paying long after my demise. I am very wary of any app that offers a basic free version and then immediately suggests an upgrade to the pro-level. Such come-ons are disingenuous; many inserting annoying ads or other links after every click. Beware. One mistake, one careless click, and your phone might be fatally infected.

As of November 2021, Google Play lists 43 mushroom identification apps of which about a quarter require payment. The rest claim to be free, some allowing a few identifications each day and then demanding a subscription, or urging you to try again the next day. The ones selected for evaluation all had 4 star-reviews or more. Such evaluations are nonsense, since the ratings are done by people even less knowledgeable than I, if that's possible. It is the classic blind leading the blind, or the ignorant leading the stupid. I can't imagine how bad the lower rated ones are. This evaluation was based on downloading six of the most highly "rated" mushroom identification apps to an Android phone and testing each against photographs of 20 mushrooms — some iconic, others more problematic.

There are two major flavors. The first, and the one that most newbies gravitate to, is the simple photo app. Take a photo, or load one from your gallery, and it will tell you what it is. Maybe. Some are slightly more sophisticated, first requesting that you select a category such as mushrooms with gills or pores, followed by your photograph. The second major group is a simple synoptic key, in which you enter a variety of features, such as color, stipe, cap, etc. This provokes a selection of photographs of possible matches from which you are invited to choose.

While some have a few warnings or disclaimers, others constantly repeat the importance of positive identification

before eating said mushroom, believing they can abrogate liability while you hover over the ceramic bowl. A family poisoning in Oregon a few years ago was ascribed to an incorrect identification on a phone app. But this is no different from reading a paper-based mushroom guide. One product even required that you sign a waiver that you had read all the warnings and would behave appropriately. Many also allow you to post to the "community" from which you may get affirmation of your identification, or not.

The first product tested had an advertisement between each click, which, if clicked by mistake, would have added another unwanted app to the phone. It managed to correctly identify three of 20 mushrooms. For the rest it gave a selection of photographs from which to choose, including disparate genera and even different families. Selecting a picture led, via another advertisement, to Wikipedia and a comment that "there is no additional information about this insect." I uninstalled the app.

The next was worse, allowing only four attempts before demanding an upgrade to the subscription version. It failed to identify all four mushrooms, coming close with "chanterelle" for a Yellow Foot, then showing five out-of-focus pictures of various chanterelles, except for *Craterellus tubaeformis*. A video game appeared in the midst of an identification, so I quickly uninstalled the app before moving to the next.

This was a very simple picture-matching app. First you selected the broad group: gills, pores, teeth, etc., then size and color, and up came a small selection of photos from which to choose. Sort of a very simplified synoptic key to the most common fungi. It referred one to MushroomExpert and Wikipedia for more information.

Edibility and toxicity comments were all over the map; one suggesting that Angel Wings (*Pleurocybella porrigens*) was deadly, conveniently avoiding the fact that no case of poisoning has been reported outside of Japan, or in people not in kidney failure. Another had a photograph of *Amanita bisporigera* that was bright blue, although the description said it was white. Another claimed that *Amanita pantherina* poisoning was rare, although it is

one of the most common causes of serious poisoning of children in the Pacific Northwest. Yet another claimed that both *Tricholoma terreum* and *T. equestre* were toxic without any further qualification. One recommended eating raw Matsutake.

Most of the apps were able to identify common mushrooms such as chanterelles, morels, and *Boletus edulis*. All were successful with *Amanita muscaria*, similar to most four-year-old children. A few managed mushrooms such as *Volvariella bombycina*. But beyond that it became a picture-matching exercise. Some had wonderful graphics, while others were more pedestrian.

iNaturalist has a notoriously poor reputation for fungal identification. I recently uploaded a few photographs of unidentified mushrooms, receiving the unhelpful comment of "Agaricales." I also uncovered a dozen sightings of *Amanita phalloides* in Texas, few of which were convincing or definitively identified. This creates a conundrum for those of us dealing with calls about possible poisonings.

There are so many problems with all these apps, it's difficult to know where to begin. All largely ignore two of the most critical aspects of identification — location and habitat. Some mention the time a species usually appears without specifying the location, which in a zone as large as North America is marginally helpful. And another had "heat maps" of the USA as to where a species was most likely to be found. If you want to use the app in the field you will need a fast Internet connection or the mushroom will deliquesce while you wait for the spinning circle to stop and proclaim a possible match. Most of the libraries of photographs in each app are extremely limited, and will often be shown regardless of the specimen you are trying to identify.

In addition to these limitations, why are these photo-matching apps so poor? Consider that the Chinese government can identify your face from a billion other people while you are walking down the street a hundred yards from the camera. It will know who you are, where you work and live, and might even guess what you are thinking. Every face is unique and has many dozens of features that can be

accurately measured and compared. Mushrooms on the other hand have to be very closely examined for subtle differences and require multiple views of each portion of the fruiting body. Most people are not trained how to do this or take the requisite number of photographs. Moreover, no one is going

to make the immense investment in time and energy needed to produce a reliable product which has a tiny market and little potential for profit.

Do not download a free app. You will get what you pay for. If you feel compelled to spend money, buy a regional field guide. Join a mycological

society. Take classes in basic mushroom identification and taxonomy. Go to organized forays. Find a local, knowledgeable and friendly expert. Sign up and post your photos on Mushroom Observer. Use some of the available online keys and discussions such as MushroomExpert. 🍄

Poetry: Excerpt from "Postcards to Ilya Kaminsky" Selected as finalist for La Piccioletta Barca Prize, October, 2020

8/4 Dear Ilya, I took the wrong bus from Heathrow Airport and so toured the thoroughfares of Southhall. Veils and robes. So many kinds of veils and robes. They don't like each other, here or anywhere, that much is clear from watching. Just as in so-called Western cultures, but with more fabric. We all know we're in trouble and either say nothing or, if we can, we make art and activism and love. Or we wear God, a god, or gods, wrapped around our bodies and faces. We see heaven in various ways, depending on the style of cloth. And I become sad in crowds. So much wet dust. Some so difficult to touch, in a cosmos from which no kind of energy or matter is ever lost, just changed. My solace is the possibility of a collective consciousness. My hope is in mycelia.

Deborah Kelly



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